REMARKS

In the current Office Action, the Examiner rejected claims 1 and 3/1, and objected to claims 2 and 3/2 for relying on a rejected parent claim. Applicant thanks the Examiner for indicating that claims 2 and 3/2 would be allowable if rewritten in independent form.

Rejections under 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 1 and 3/1 under 35 U.S.C. § 103(a) as being unpatentable over the Mann reference (U.S. Patent No. 5,828,793) in view of the Krymski reference (U.S. Patent No. 7,209,166). Specifically, the Examiner remarked:

> Mann discloses a method of creating an image with a still video camera (col. 11 lines 43-46, figure 8, element 202). Mann further teaches that the image is transferred to a computer to be stored on a main memory 210 represented as 212_1, 212_2, 213_3 etc. (col. 11 lines 46-54). Mann also teaches that the composite images [are] formed from a series of input images wherein every pixel of the composite image is drawn from the corresponding pixel in each of the input source images according to a weighted average. The weighting is based on a certainty function associated with each source image pixel corresponding to an output pixel in the final composite image. The value of the relevant pixel parameter for a given final-image pixel (weighted average of n samples) is given by
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> $$\sum_n c_n P_n / \sum_n c_n$$
>
> where c_n is the certainty function associated with the corresponding pixel of each source image n (col. 6 line 51-col 7 line 8). It is noted that P_n (pixel parameter) is dependent upon exposure time, brightness or luminance

> and the gain of the system. Mann teaches that the resulting pixel image represented by the expression above is saved in a target buffer 250 whose contents are shown on screen display 234 (col. 12 lines 32-49). The features such as gamma correction (other image data) are also stored in the target image data (col. 13 lines 4-8).
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> Mann fails to teach explicitly obtaining a substantially linear representation of the image by combining two images. However[,] Krymski teaches to write the image signal into the memory twice, first after [a] short integration and then after [a] long integration. Thus, after two operations of sampling, the result[ing] voltage in the memory will be a linear superposition of the two signals representing [the] bright and [the] dark image (Col. 3 lines 2-9, figures 1 and 3). Fig. 4 clearly teaches that [the] combined signal is a substantially linear representation of the brightness (light intensity) of the image [acquired] by combining two images. It is noted that in order to obtain a wide dynamic range image the two long and short exposure images are combined so that the final image produces increased highlight detail despite the limited response of the system that produced the component images[.]
>
> Therefore[,] taking the combined teachings of Mann and Krymski, it would be obvious to one skilled in the art at the time of the invention to have been motivated to have obtained a substantially linear representation of the image by summing two images in order to obtain a wide dynamic range image so that the final image provides increased highlight detail despite the limited response of the system that produced the component images.
>
> [Claim 3/1]
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> Mann teaches that the different images are color so that the offset will be color dependent (col. 13 lines 21-30).
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> Office Action, pages 6 and 7.

In the Response to Arguments section of the current Office Action, the Examiner stated the following:

Applicant argues with regards to claim 1 that Krymski do[es] not teach obtaining a substantial linear representation of the brightness of an image since the diagram proves that Krymski's system does not provide a linear response. It consists of two straight line segments whereas the present invention would produce a single invention. The Examiner respectfully disagrees. First, Krymski clearly states that

"In wide dynamic range operation, the idea is to write the signal into the memory twice, first after short integration and then after long integration. The pixel 100 in FIG. 1 is based on voltage sharing between the photodetector PD and the analog memory C2. Thus, after two operations of sampling, the resulted voltage in the memory will be a linear superposition of the two signals representing bright and dark image."

As shown in figure 4 above the combination is a straight line representation. Therefore the "output is substantial linear representation of the brightness of an image" exactly as claimed. [The] Krymski reference exactly as the claim recites and obtains a substantial linear representation of the brightness of an image after the images are combined.

The claim never recites that the "piecewise linear" is to be excluded. As long as any part of the output is linear with respect to the brightness, it reads on the claim, since it only recites "**substantial** linear representation of the brightness of an image". The claim does not even recite "linear representation of an image". It recites substantial linear representation which does not exclude the teachings of Krymski. Therefore[,] it is suggested that the applicant claims the invention to cover the fact that the image is linear for the whole range of brightness values and not just being "substantial linear" in order to overcome Krymski's reference. Therefore the rejection would be maintained.

Office Action, pages 4 and 5 (emphasis in original).

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (B.P.A.I. 1979). To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 U.S.P.Q. 580 (C.C.P.A. 1974). However, it is not enough to show that all the elements exist in the prior art since a claimed invention composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). It is important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. *Id.* Specifically, there must be some articulated reasoning with a rational underpinning to support a conclusion of obviousness; a conclusory statement will not suffice. *In re Kahn,* 441 F.3d 977, 988 (Fed. Cir. 2006). Indeed, the factual inquiry determining whether to combine references must be thorough and searching, and it must be based on *objective evidence of record*. *See In re Lee,* 61 U.S.P.Q.2d 1430, 1436 (Fed. Cir. 2002).

It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 U.S.P.Q. 769, 779 (Fed. Cir. 1983); M.P.E.P. § 2145. Moreover, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (C.C.P.A. 1959); see M.P.E.P. § 2143.01.

One important indicium of nonobviousness is "teaching away" from the claimed invention by the prior art or by experts in the art at or after the time the invention was made. *U.S. v. Adams*, 383 U.S. 39, 148 U.S.P.Q. 479 (1966).

Features Missing from the Cited References

Independent claim 1 recites, *inter alia*:

> obtaining a **substantially linear** representation of the brightness of an image, the method comprising, for each of a set of pixels (x, y) in a two dimensional array, calculating an estimate of the true image intensity (i_{xy}) as a weighted average of n samples of the apparent image intensity ($v_{n,xy}$) as
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> $$\hat{i}_{xy} = \frac{\sum_n \left(w_{n,xy} \left(\frac{v_{n,xy} - C}{KT_n} \right) \right)}{\sum_n w_{n,xy}} = \frac{1}{K} \frac{\sum_n \left(w_{n,xy} \left(\frac{v_{n,xy} - C}{T_n} \right) \right)}{\sum_n w_{n,xy}}$$
>
> where $v_{n,xy}$ is the apparent intensity measured, n is greater than or equal to 2, T_n is the exposure time, K is the gain of the system, C is an offset and $w_{n,xy}$ is a weighting factor which is defined to maximise the signal to noise ratio and discard insignificant, that is saturated or near zero, values;
>
> thereafter saving each of the values i_{xy} together with other data representing the image; and
>
> outputting the image to a display or to a printing device. (Emphasis added.)

Applicant asserts that the Examiner still does not appear to understand the meaning of "a linear response" as the recitation would be understood by one of ordinary skill in the art. The Applicant has explained what is generally meant by the term (and

that the same meaning is intended in claim 1) several times during the prosecution history. Present embodiments are directed to producing a response to light intensity that is linear over its whole range: that is, if one plotted it, the graph would be a single straight line through the origin. The only reason the term "substantially" linear is used is because there are bound to be minor imperfections due to noise (in the "real world").

By contrast, the references cited as prior art either do not (Mann) or cannot (Krymski) teach how to produce a linear response. Indeed, the *whole point* of the Krymski patent is to obtain a non-linear (in fact, quasi-logrithmic) response to light (Krymski is jus the sort of problematic approach that is conventional in the prior art and which we want to overcome.); the non-linearity is systematic rather than being due to imperfections. It does this by exploiting the fact that each response (long, short exposures) is limited by saturation and is therefore *non-linear*. (A piecewise linear response is still non-linear; a series of straight lines is not the same as a single straight line). The response provided by the "linear supposition of the two signals" is also non-linear, because each response is individually non-linear. The Applicant refers the Examiner to the Krymski equations in column 3, both of which contain a component (C1 + C2) squared. Surely the Examiner must understand that this makes the Vsignal result non-linear.

In present embodiments, pixels that are too bright or too dark to be captured in the linear range of the sensor are automatically excluded from the calculations and therefore also from the overall response. As indicated previously, if the Applicant wanted to draw

a diagram to demonstrate to someone that the disclosed embodiments of the Krymski reference are inferior to present embodiments, the Applicant would use Figure 1 because it clearly shows that the response to light is non-linear.

Therefore, as asserted throughout the prosecution history, Krymski does not teach anything about achieving linearity (and as a result of teaching piecewise-linear actually teaches away from the present invention), and this point is also missing from Mann. Consequently, a combination of Mann and Krymski does not result in the present invention and the present invention is non-obvious. For these reasons among others, Applicant respectfully requests withdrawal of the rejection under 35 U.S.C. § 103 and allowance of all pending claims.

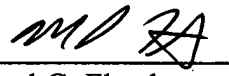
Conclusion

The Applicant respectfully submits that all pending claims are in condition for allowance. However, if the Examiner wishes to resolve any other issues by way of a telephone conference, the Examiner is kindly invited to contact the undersigned attorney at the telephone number indicated below.

In accordance with 37 C.F.R. § 1.136, Applicant hereby provides a general authorization to treat this and any future reply requiring an extension of time as incorporating a request thereof.

Respectfully submitted,

Date: January 16, 2009



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